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The result of the search for an intra-Mercurial planet near the Sun at the eclipse of June 8, 1918, may then be summed up as follows: In an area approximately 5° wide, extending from 2° east to nearly 6° west of the Sun, there was found no suspicious object as bright as magnitude 8.5. The area just described represents quite accurately the size of the fortunate hole in the clouds thru which the eclipse was observed, as some cutting off is suspected at the outer corners of the western plate. HEBER D. CURTIS.

A PERIODIC TERM IN OBSERVATIONS OF RIGHT ASCENSION[1]

Observations of a fundamental character made with the meridian circle at the Lick Observatory in the years 1905 to 1908 exhibit differences in the transits recorded by chronograph similar to those noted by Mr. Zimmer at Cordoba in 1917 and 1918.[2]

Our determination is based upon three sets of comparisons of clock corrections observed at various hours of the day and night, which may be combined in groups to show the relative difference between transits near sunrise and sunset. In the first set there are twenty comparisons of the results from two groups of stars differing twelve hours in right ascension, in which the observed correction from one group is compared with the correction interpolated from the observed corrections of the other group. The interpolation of the rate is for half a day in each case. These observations were made in 1905 and 1906, and from the same series there are thirty-six comparisons of the clock correction from *a Andromedae* with the corrections from the group of stars fourteen hours later. The Dent Sidereal clock (No. 4) was in use at that time.

The third series was made in continuous periods of observing of two days each, each period containing four groups of stars with six hours in a group, observed twice when possible. Mr. R. F. Sanford and I alternated in the observing of September and October, 1907, and April, 1908, the bad weather in the spring of 1908 having prevented the observations of a fourth period as planned. There are twelve comparisons in this series between groups of stars differing by twelve hours of right ascension. The Riefler clock (No. 5) was in service for these observations, running under constant atmospheric pressure (barometric). All comparisons give approximately the same mean results—sunrise transits recorded relatively later than those at sunset by $0^{s}.05$.

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[1] Abstract presented at the Pasadena meeting of the *Ast. Soc. Pac.*, June 19-20, 1919.

[2] *Astron. Jour.*, **32**, 1, 1919.

There is no probability that any sensible part of this difference is due to the parallax of the stars observed. The effect is too great, of the order $0''.3$ to $0''.4$, for the average of the stars. Many attempts have been made to observe for parallax with the meridian circle in this manner, the earliest on record being that of Roemer at Copenhagen, over two hundred years ago. The differences found in the early results were shown to have been undoubtedly due to periodic variations in the daily rates of the clocks, between the hours of day and night. With our modern clocks very accurately compensated for changes of temperature, and in many cases protected from the effect of variations in atmospheric pressure, no large daily periodic fluctuations in rates should be anticipated. The amplitude of the changes under discussion is, however, very small, and there are other conditions than changes of temperature and pressure that may slightly affect the rate of a good clock.

Since various observers at different locations find similar periodic variations in clock corrections, the cause is more likely to be found in some of the observing conditions, rather than in the rates of the clocks used. The change in the refraction in zenith distance which occurs here and at San Luis, between day and night, may be accompanied by a horizontal component of disturbance at the critical epochs of sunrise and sunset. The effect might be explained by a tilting of the air strata, due to the heating of the upper atmosphere before sunrise, when our surface record of temperatures would lag behind that corresponding to the conditions of the whole atmosphere above us. At sunset the heating of the upper air strata would lag behind the exposure of the surface strata.

In zenith distance the total change between day and night is about one per cent of the total refraction, the change occurs during periods preceding and following sunrise and sunset of about two hours each side of those epochs, and the effect at those epochs would be about half the total change. This effect would be of nearly the same order as that of a possible horizontal component, a refraction disturbance that has always been evident in geodetic observations of long lines at various hours of the day. The disturbance in geodetic observations is generally less noticeable just preceding sunset than at other hours.

R. H. TUCKER.